CHEMONICS INTERNATIONAL INC.

ENVIRONMENTAL COMPLIANCE AUDIT REPORT FOR JILT AND DRAGOTESTI COAL MINES

Support to Enhance Privatization, Investment, and Competitiveness in the Water Sector of the Romanian Economy (SEPIC)

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PART 1

Overview

1.1 INTRODUCTION

This report includes the findings of the Phase I Audit that was carried out at Jilt and Dragotesti Coal Mines belonging to the Turceni Energy Complex. This audit was prepared under a subcontract with Chemonics International Inc., part of the Support to Enhance Privatization, Investment and Competitiveness in the Water Sector of the Romanian Economy (SEPIC) Project, financed by the United States Agency for International Development (USAID) and implemented by Chemonics International Inc.

The audit of the sites is part of the due diligence for privatization of Turceni Energy Complex.

The audit report includes:

- General information on the sites and the activities in place;
- Presentation of specific conditions for conducting the audit;
- General description of environmental regulations;
- Findings of the audit.

The report is divided into three parts:

- Part One includes general considerations regarding the sites, climate and geology, common to both sites, as the two sites are located located close to each other, and the audit methodology.
- Part Two includes the audit report for Jilt Coal Mine (CM), the findings of the audit and a summary of environmental compliance actions.
- Part Three includes the audit report for Dragotesti CM, the results of the audit and a summary of environmental compliance actions.

1.1.1. Objective

The objective of the environmental audit was to assess the environmental practices, and the measures to be taken for environmental compliance with the relevant legal provisions at Jilt and Dragotesti CM in order to determine existing and potential environmental liability associated with these mining operations. During the audit, health and safety data were also collected.

1.1.2 Limitations

The audit undertaken by Chemonics International Inc. and S.C. ECEROM Group is based on written and oral information provided by the representatives of both entities. The auditors consider such information to be typical for the real mining environment of both sites and the information provided was confirmed during the site visits. INSEMEX Petrosani and A.F. Patrutoiu carried out environmental balances for both sites in 2003. Those reports were equally an information source for the audit.

Considering the size of sites area and the large number of activities, the audit focused on identifying major non-compliances regarding: air emissions, management and the treatment of liquid effluents, management of toxic and hazardous substances, and waste management and disposal.

1.2 GENERAL ENVIRONMENTAL CONDITIONS

1.2.1 Description of sites

Jilt and Dragotesti CM are located in the southern part of Romania, 300 km west from Bucharest, in the western part of Gorj County. Jilt and Dragotesti coal mines are located in the Motru-Jilt-Rovinari Coal Basin, on the administrative territories of Silvesti, Dragotesti, and Matasari villages.

Fig.1 Map of Gorj County

1.2.2 Climatology

The meteorological parameters were measured by and at the nearest meteorological stations - Targu Jiu and Apa Neagra - located. Targu Jiu station is located 22-25 km north-east, and Apa Neagra station is located 14 km north-west from the Jilt Motru area. To assess the local climatic environment, the parameters values were reviewed and interpreted.

The local geographic factor plays an active role in altering the meteorological parameters in the area.

Air temperature
January is the coldest month of the year. The average temperature is -25ºC at both meteorological stations. July is the warmest month of the year with average values between 20.6ºC and 21.4ºC.

Rainfall
Rainfall varies significantly within the study area. Data provided by Matasari rainfall monitoring station was also considered, in order to achieve a relevant and objective analysis of rainfall distribution in the area.

The highest monthly average of rainfall quantities occur at the end of spring (May, 86-103 l/m^2) and the beginning of summer (June, 92-98 l/m^2).

The monthly and the annual quantities significantly exceed the average values in the years with high cyclonic activity.

Wind
The annual average of atmospheric calm at both stations—63.3% at Targu Jiu and 74.1% at Apa Neagra—indicate the sheltered specific of the area. The prevailing annual wind directions are approximately the same, while the values of frequency are slightly changed. However, the frequency of calm significantly increases in winter (74.1% at Targu Jiu and 80.4% at Apa Neagra) and in autumn (67.7% at Targu Jiu and 77.1% at Apa Neagra).

1.2.3 Hydrography of the area

Ground water
Lignite deposits are in the northwestern part of the great hydro-geological basin quartered on Dacian and Romanian deposits in Oltenia, with significant statistic and dynamic water reserves. The exploration of the area revealed the presence of ground water at shallow depths, of 2-3 m, in the Sub-Carpathian depressions and in the alluvial plains of the piedmont area. Ground waters are quartered 20 m deep on interfluves and 7 –8 m deep on terraces.

Surface water
The mines are located in the Jilt and Jiu Hydrographic Basin. The hydrographic basin of the Jiu River covers an area of 10,469 km^2 and collects the rivers springing from the southwestern part of the Southern Carpathians, the Western Carpathians, and the Getic Piedmont.

The Jilt, a right-side affluent of the river Jiu, has a river basin of 375 km^2 and a length of 49.4 km, and is located in the Getic Piedmont area. Consequently, the drainage is poor andthe river runs dry during the drought periods of the year, as the ground water level is lower than the main river bed . Along its valley the Jilt has an inner terrace level and its meadow reaches widths of 100-400 m.

1.2.4 Geology of the area

The availability of abundant lignite deposits that may be mined in open pits enabled the establishment of the mines in the area.

Geologically, the area belongs to the Getic Depression. The Getic Depression is a sedimentary area formed from the Paleogene to the Neogene. The Neogene deposit between the Danube and the Olt is a complex of coal-bearing and argillaceous-sand ground that belongs to the Meotian, the Pontian, the Dacian and the Romanian.

The Romanian layer is identified by a mixed fauna - Viviparus bifarcinatus, Viviparus structuralis, Psilunio recurvus, Valvata sulckina, Melanopsis rumana – and includes lacustrine deposits, with widths varying from 70 to 90 m, and lignite layers VIII-XII, which have an economic importance.

Geology of coal deposits
The sedimentary deposits in the mining area belong to the Dacian, the Romanian, and the Quaternary and have a thickness varying in the range of 0- 25 m.

The Dacian deposits crop out on valleys toward the north and the northeast of the perimeter and are made of clay and sand, and the coal layers V, VI, and VII.

The Romanian includes a bottom level made of clay and sand and lignite layer VII, and the overburden incorporating a coaly argillaceous-sand complex and the lignite layers VIII-XII.

Bottom Pleistocene deposits represent the Quaternary. The bottom Pleistocene is represented by two levels: one argillaceous-sand levels with lignite layer XIII and another argillaceous-sand level with lignite layers XIV and XV.

Late alluvial deposits in the Jilt meadow and deluvial-proluvial deposits on mountainsides represent the Holocene.

In the mining area, the lignite deposit is located on the south flank of the Runcurel – Rovinari anticlinal, and has a southern–southwestern general monoclinic development and a down dip of 10% to the southeast, with no major tectonic derangement.

The existing faults in the area divide the deposit in blocks. Generally, the fractures have unevenness of the order of meters and are located throughout the entire mining area.

Lignite layers III, IV, and I have no economic importance.

Lignite layer VI has sedimentary continuity over the whole Jilt south perimeter . It is lithologically homogeneous and situated 20-30 m deep from layer V. The average thickness of the coal layer is 2.00 m and was intercepted at 20-135 m depths.

Lignite layer VII is located 1-20 m from layer VI has sedimentary continuity over the whole perimeter. It is 0.35-3.15 m thick and was intercepted at depths varying from 25-130 m.

Lignite layer VIII is the most important economic layer due to its sedimentary continuity all over the perimeter, to its lithological homogeneity and qualitative and quantitative characteristics. It crops out along the Runcurel and the Malului valleys. Its prevailing thickness is over 2.00 m. It was intercepted at 20-110 m depth and is located at 0.80-35 m from layer VII.

Lignite layer IX crops out through the southern portion of the Jilt along the Runcurel, Jilt, and Malului valleys. It was found at 30-105 m depths. Its thickness varies between 0.1 and 2.7 m.

Lignite layer X has economic importance due to its thick extractable depth. It crops out on the Jilt, Runcurel and Malului valleys. It was intercepted at 3-105 m depths. From the seven lignite banks, there were separated the bottom level X with a thickness of 0.25-1.6 m, at a depth of 1-14 m from the layer X, and the overburden X with the thickness of 2.45-7.8 m.

Layer XI covers small areas.

Layer XII has sedimentary continuity in the perimeter. It was intercepted at 14-41 m depths.

Layers XIV-XV were intercepted just on the crest of hills in the central and southern parts of the perimeter as retrogressive post-erosion patches, with an average thickness of about 1m. Layer XIV has a thickness of 0.3-3.6 m.

The lignite deposit has been included in the Ist class of geological complexity considering its natural main factors.

Quality of coal

Lignite in the perimeter is blackish and dark brown colored coal in the bedding plan, and is slabby. It dries when coming into contact with air and exfoliates following the bedding plan. The laboratory tests conducted on samples taken from lignite layers showed the following qualitative characteristics:

- Total humidity 27.27-50.77%
- Ash-dry coal ratio 22.36-40.20%
- Volatiles-flammable mass ratio 54.70-60.70%

- Carbon-flammable source ratio 31.57-42.06%
- Lower heat power value-flammable mass ratio 1,200-3,975 Kcal/Kg

Hydrogeology of deposits
According to the lithology of the area, banks and sand strata are separated from each other through clay and coal layers, which are impermeable screens, so that the hydrogeological parameters differ from an aquifer to another.
There were established the following aquifers:

- Phreatic aquifer
- Aquifer in the beds of layer IV
- Aquifer in layers zone IV-V
- Aquifer in layers zone VI-VII
- Aquifer in layers zone VII-VIII
- Aquifer in layers zone VIII-X
- Aquifer in overburden X

The prevailing fine and powdery lithological composition influences the flows and the filtration coefficients, which are small, and consequently the drainage becomes difficult.

1.2.5 Seismic potential of the area

Two main types of earthquakes may affect the area:

- Intermediate earthquakes with the epicenter situated under the crust of earth, in the overburden, 80-180 km deep, in the Vrancea area
- Normal earthquakes, with the epicenter situated in the crust of earth, in the faults of the Getic Piedmont of the Walachian Platform, 5-30 km deep, mostly influenced by intermediate earthquakes

From a seismic point of view, according to STAS 11.100/1-1978 Standard, the area is included in the 7^{th} grade of seismic macrozone. According to the P100/1991 seismic protection norm for buildings, it is included in the E zone.

The ratio between maximum acceleration of seismic movement and gravitational acceleration Ks=0.12 is particular to the area.

As to the peak period of the design specter (Tc), the value for the southern Jilt area is Tc=1.0 sec.

1.2.6 Soil

Before exploration began in Jilt coal mining area, the ground covering the area of Matasari village was included in the brown wood soil category: It is highly podzolic because of its argillaceous sand-clay structure in the overburden.

The typical residual-carbonaceous brown wood soil has the following typical structure:

Am	0-20 CM	Powdery, brown-grey clay, without structure
Al	0-40 cm	Powdery clay, darker than the above-mentioned soil, grained, unstable, more compact structure
Bla	40-70 cm	Clay, heavier texture, more compact, brown-grey; prismatic-nutform
B2	70-100 cm	Powdery clay, irregular, brown and brown-fawn colored, less compact, big prismatic structure
BC	100-120 cm	Powdery clay, light brown, no structure, less compact
C	120-145 cm	Powdery clay, light brown, multiple carbonates efflorescent

As to the chemical composition, a uniform grain-size structure, and higher clay content in the middle of the profile are noted.

1.2.7 Topography

The maximum elevations in the studied perimeter (Malului Hill, 350m; Jgheabul Hill, 330m; Arsitei Hill, 374m, Croici Hill, 318m; Daesti Hill, 357m) do not exceed the maximum height of Miculesti Hill (381m). There are depressions in the Jilt, Malului, Runcurel and Croici Valleys. All secondary valleys opening out towards the Jilt valley are generally oriented from west to east.

1.3. LEGAL PROVISIONS

This chapter refers to the general environmental legal framework in Romania, and the environmental norms applicable to the sites. The regulations applicable to sites are part of Romanian legal system. The Romanian environmental legal framework is rapidly being harmonized with the relevant European Union framework.

1.3.1 Law No. 137/1995 on the Environmental Protection

The Environmental Law 137 of December 29, 1995, revised and republished in 2000 and 2002, integrates the legal environmental regulations. The Environmental Law includes:

- Chapter 1, General Principles and Provisions
- Chapter 2, Regulation of Economic and Social Activities having an Environmental Impact, such as:
  - Permitting procedure
  - Regime of dangerous substances, hazardous wastes, and of other wastes
  - Regime of chemical fertilizers and pesticides
  - Regime for assuring the protection against ionizing radiation and safety of radiation sources
- Chapter 3, Protection of Natural Resources and Conservation of Biodiversity, and in addition:
  - Protection of waters and of aquatic ecosystems
  - Protection of atmosphere

  - Protection of soil, subsoil, and of terrestrial ecosystems
  - Regime of protected areas and natural monuments
  - Protection of human habitat
- Chapter 4, Prerogatives and Responsibilities, such as:
  - Prerogatives and responsibilities of the environmental protection authorities
  - Prerogatives and responsibilities of central and local authorities
  - Obligations of natural and legal persons
- Chapter 5 establishes The Penalties for Violating Environmental Law Provisions.
- Chapter 6, Final and Transitory Provisions, notes that:
  - The central environmental protection authority shall be the Ministry of Waters and Environmental Protection
  - The specific domains (air, water, wastes) shall be regulated through specific regulations
  - Law no. 9/1973 on environmental protection shall be abrogated at the date the new law comes into force

The law defines the general principles in the environmental protection arena, exclusive of specific air, water, and waste norms.

1.3.2 Law 107/ 26 September 1996: Water Law

Water Law regulates management of water resources and their protection against pollution. The law includes:

- Chapter 1 – General Provisions:
  - Principles of law
  - Establishment of public and private interest surface waters
  - Establishment of water resource use regime
  - Definition of water exploitation regime
  - Establishment of the authorities responsible for with the management of water resources

- Chapter 2 – Water and River Beds Use Regime:
  - Section I: Water use regime:
    - Surface and ground waters use regime
    - Regulation of priorities to assure drinking water for the population
    - Exploitation regime of water reservoirs
    - Water use and consumption restrictions regime in case of emergency
    - Measures for the protection of water resources
    - Obligations of water consumers
    - Obligations for preventing accidental pollution
    - Establishment of indemnification for damages

  - Section II: River Beds Use Regime establishes:
    - The access to and on watercourses
    - The works and buildings in the riverbeds area

  - Section III: Servitude and Expropriation Regime:
    - Establishment of works and arrangements in hydrographic basins that may be expropriated against proper compensation
    - Establishment of wood planting or cutting in hydrographic areas

- Chapter 3 – Water Management establishes the principles for:
  - Investigation and management of data pertaining to water resources
  - Protection of minor river beds, banks and water management works
  - The structures of the river basins
  - The regime of the works built on waters, or related to waters
  - Water management licensing and permitting procedure
  - Prevention and control of floods
  - Public participation in the decision-making process

- Chapter 4 – Inspection of the water management activity, establishes the authorities that have the right to perform specific water management inspections.

- Chapter 5 – Water Economic Mechanism establishes the payment system, the allowances and penalties, specific to water management activities, as well as:
  - Establishment of the Water Fund;
  - Financing of water management investments.

- Note: Water Law is currently under revision, in order to update it according to progress made in the *acquis communautaire.*

- Chapter 6 – Penalties.

- Chapter 7 – Transitory and final provisions and establishes the obligation of water users to equip themselves with local waste water treatment plants or installations, and the abrogation of Water Law 8/1974.

1.3.3 Law 655 / 20 November 2001: Atmosphere Protection

The Atmosphere Protection Law establishes the legal framework for preventing and limiting the deterioration of and for improving the quality of the atmosphere.

Chapter 1 sets the main goals of the national strategy on atmosphere protection.

Chapter 2 – Prerogatives ans Responsibilities:

- Prerogatives and responsibilities of competent authorities in the domain of atmosphere protection
- Prerogatives and responsibilities of local public authorities for environmental protection
- Prerogatives and responsibilities of other central and local public authorities regarding health and safety, and local administration

- Prerogatives and responsibilities of central public transport authority
- Prerogatives and responsibilities of central public industry and trade authority
- Prerogatives and responsibilities of central public agriculture and food authority
- Prerogatives and responsibilities of central public authority for the coordination of the local public administration

Chapter 3 – Air Quality:

- Assessment of ambient air quality, reference pollutants, accomplishing air quality action plans
- Monitoring of air quality and emission levels

Chapter 4 – Pollution source and their control:

- Pollution source and their control, fixed pollution sources, responsibilities of activity-holders, emergency prevention and preparedness plans for major accidents
- Establishing charges for polluting air emissions
- Control of mobile and diffuse sources, obligations for the users of mobile pollution sources
- Control of chemical substances that may impact the atmosphere quality.

Chapter 5 – Violations and crimes

Chapter 6 – Final Provisions

1.3.4 Law 645/7 December 2002: Integrated pollution prevention, reduction and control (IPPC)

Law 645/2002 establishes an integrated approach for using the best techniques for pollution prevention, reduction and control, and for issuing environmental integrated permits for industrial activities having a major environmental impact.

The law establishes:

- Prerogatives and responsibilities of competent environmental authorities
- How to obtain t integrated environmental permits
- Issuing procedure of integrated environmental agreements and permits for new, existing or in course of revamping equipment
- Responsibilities of activity-holders
- Procedures and documentation required for environmental permitting
- Penalties for violations of law
- Appendixes including activities regulated by the law on integrated pollution prevention, reduction, and control

1.3.5 Order 22.740/18 October 2001

This Order approved the Technical Norms regarding the implementation and monitoring of the measures established in the Environmental Compliance Schedule and the Environmental

Rehabilitation Plan, and established the frame of financial operations with bank guarantee to cover the rehabilitation costs of the environment damaged by mining activities.

The Order was issued jointly by the National Agency for Mineral Resources and the Ministry of Agriculture, Waters and Environmental Protection and states that:

- The rehabilitation of the environment damaged by mining activities shall be included in the exploration plan, in the mining exploitation development plan, in the environmental rehabilitation plan and in the compliance schedule of the environmental permit;
- The annual schedule of works shall also include environmental protection works within the mining perimeter
- The operators of mining exploration/exploitation shall annually submit to the territorial inspectorate/section of the National Agency for Mineral Resources a report on the status of environmental rehabilitation works, according to the compliance schedule of the environmental permit, and on the status of environmental protection works
- The operators shall deposit a bank guarantee for environmental rehabilitation, which shall be calculated according to the procedure set forth by the order. The bank guarantee shall cover the accomplishment of such works, in case the license-holder would stop its activity and the environment rehabilitation works have not been carried out

1.3.6 Technical Norms

The technical norms that are applicable on sites regard air, water, surface and ground water quality.

Air emission norms

Air emissions norms are defined by reference to air quality at the level of receptors (ambient levels), and to the level of emissions.

The emission norms are defined in STAS 12574 – 87 - Air quality in protected areas – that defines the substances and the maximum allowable concentrations depending on the exposure time (short or long time). The concentrations are expressed in mg/m^3 of air. The applicable concentrations for the audited activities were are the following:

- Suspended particulates: 0.5 mg/m^3 – maximum allowable concentration for a short time exposure (30 min.) and 0.15 mg/m^3 – maximum allowable concentration for a long time exposure (continuous, 24 hours), or 0.075 mg/m^3 for 1 year of exposure.
- settling particulates: 17 g/m^2/month.

Note: STAS 12574-8 7 standard makes no difference between suspended particulates and the inspirable particulates of 2.5 μm, 5 μm and 10 μm.

The **Order of The Ministry of Waters and Environmental Protection No. 592/2002** has been issued to regulate emissions of toxic substances into the atmosphere. The Order approves the norms regarding establishment of the limit values, of the thresholds values and of criteria and

methods of assessment of sulphur dioxide, nitrogen dioxide and nitrogen oxides, suspended particulates (PM10 and PM2.5), lead, benzene, carbon monoxide and ozone in ambient air.

The Order 592/2002 sets air pollutants limit and target values up to 2010. The data regarding suspended particulates matters are as shown in Table 1.

Table 1. Tehnical Norm for Suspended Particulate Concentration in the Atmosphere (according to Order 592/2002)

PM10 suspended particulates	Averaging time	Limit value	Term for compliance
PHASE I – GOAL FOR 2007			
Daily limit value	24 hours	50 MG/M^3 – NOT TO BE EXCEEDED MORE THAN 35 TIMES/YR	Jan. 1, 2007*
Annual limit value	1 year	40 µg/m^3	Jan. 1, 2007
PHASE II– GOAL FOR 2010			
Daily limit value	24 hours	50 MG/M^3 – NOT TO BE EXCEEDED MORE THAN 7 TIMES/YEAR	Jan. 1, 2007**
Annual limit value	1 year	20 µg/m^3	Jan. 1, 2007

** Reduced by 50% until the 1st of January 2005 from the date the order comes into force, and then equal percentages of abatements per year targeting the limit to be reached the 1st of January 2007.*

*** Reduced by 50% until 01.01.2005 and then equal percentages of abatements per year, from 12 to 12 months, reaching 0% the 1st of January 2007.*

Water discharge norms

The water discharge norms are established according to the wastewater receptor. The Government Decision 188/2002 approves the NTPA – 001 Norms applicable to the audited sites were. Limits are as shown in Table 2.

Table 2 EXCERPT FROM THE TECHNICAL NORM FOR WASTE WATER DISCHARGE TO NATURAL RECEPTORS NTPA-001 – applicable in the audit

Parameter	Measurement Unit	Allowable limit value acc. NTPA-001
pH	pH Units	6.5…8.5
Biochemical oxygen demand (BOD_5)	mg/l	20 (25)
Chemical oxygen demand (COD-Cr)	mg/l	70 (125)
Chlorides (Cl^-)	mg/l	500
Sulphates (SO_4)	mg/l	600
Calcium (Ca)	mg/l	300
Magnesium (Mg)	mg/l	100
Ammonia (NH_4)	mg/l	2 (3)
Total Nitrogen (N_{tot})	mg/l	10 (15)
Phenols	mg/l	0.3
Total Iron	mg/l	5
Total phosphorus	mg/l	1 (2)
Suspended particulates	mg/l	35 (60)

Note – the values in brackets apply to new waste water treatment stations.

Other norms

Noise and vibrations values shall not exceed 60 dB at the border of the work perimeter. In the working area, with no protection equipment, the upper allowable limit is 90 dB, as established by health and safety criteria. The vibrations limits in residential areas are established by STAS 12025-94 standard , which is equivalent to the European standard ISO 4866/1990 – Guidelines for the measurement of vibrations and evaluation of their effects on buildings.

Order 1.147/10 December 2002 of the Ministry of Waters and Environmental Protection approves the Technical Standard on wastes storage: building, operating, monitoring and closing waste dumps.

1.4 DEVELOPMENT OF THE AUDIT

1.4.1 Summary

To conduct the audit, Chemonics International worked with ECEROM Group. ECEROM Group is a subcontractor to Chemonics International Inc. The latter supervised the works and particularly, the objectivity of the audit.

The audit mainly includes:

- Review and analysis of the documentation provided by the entities that were audited, Jilt and Dragotesti CM
- Field trips to the coal mines together with the personnel on site
- Collection of data and of additional information
- Report drafting

1.4.2 Audit management

The overall team included:

- Christopher Perine, deputy project manager:
  Together with the audit team reviewed the audit objectives during 15-16.03.2004
  - Visited the site of Jilt CM from 23 to 24 April 2004 to conduct site assessment and to initiate the audit process
  - Established the guidelines of the audit report

- Ionescu Liviu, Project chief of party, coordinated the activities during the time of the audit.

The audit team included:

- Radu Dornean, Ph.D., project manager for ECEROM, who conducted audit during three field trips, between 15th of March and 8th of April 2004

- Viorica Dumitru, SEPIC Project Assistant, from Chemonics International visited the Jilt site, and participated in data collection on site
- Margarit Laura, eng., was involved in data processing and interpretation

Several employees of both mines contributed to transferring information to the audit team, as follows:

- From Jilt CM
  - Racovita Ion, eng., Director for OHS and Environment, a privileged interlocutor of the audit team who organized the site tours and collected the information we have asked for
  - Stoichitoiu Valentin, eng., Chief of Health and Environmental Protection Office;
  - Vatoiu Maria eng., Environmental representative
- From Dragotesti CM
  - Catea Eugen, eng., Deputy mine manager, organized the site tours and collected the information we have asked for
  - Ivanovici Ioan eng. – Environmental representative

1.4.3 Auditing methodology

The information collection and analysis included:

- Interviewing mine staff;
- Follow-up site inspections to check the data provided by the staff;
- Review and evaluation of previous reports and studies.

Review of the documents provided by Jilt an Dragotesti CM and site tours
This step of the audit was conducted between March 18 and April 6, 2004 and consisted of a systematic analysis of each site, and of each activity on site. The analysis included:

- Review of provided documentation
- Site visits and interviews with environmental, health and safety, and operations staff;
- Drafting of a synthesis report for each site, describing environmental conditions, and existing and potential environmental non-compliances
- Review of history site
- Assessment and confirmation of environmental non-compliances

Two environmental reports for both sites, carried out in 2003, are worth mentioning. The reports are: “Environmental Balance Level I – regarding the mining activity at Dragotesti CM” prepared by A.F. Patrutoiu, and “Impact Study of the (mining) activities in the vicinity of certain communities” prepared by ISEMEX Petrosani.

Review of both studies enabled the collection of information on mine exploitation and its environmental impact, but did not provide sufficient information on environmental rehabilitation according to the applicable regulations.

In order to identify all environmental aspects, the team completed the audit for each site, and analyzed the documentation and practices regarding environmental management.

During the site visits, the auditing team assessed:

- Air emissions: identification of discharge points, pollutants and particulates composition, the existing pollution prevention equipment and its operation, and the potential pollutants flows and concentrations discharged in the atmosphere
- Water management: water use, household and industrial wastewater and rainwater collection network, pollutants nature, existence and operation of wastewater treatment systems, discharge points, results of measurements at each discharging point
- Waste management: nature and quantity of generated waste, landfill areas, waste disposal pathways
- Management of toxic and hazardous waste, waste storage, above surface and underground tanks, soil pollution in the vicinity of landfills
- Use of asbestos, CFC, or PCBon site
- History of previous activities, environmental incidents that resulted in environmental impacts
- Collection of information on health and safety issues

PART 2

ENVIRONMENTAL COMPLIANCE AUDIT, JILT COAL MINE

PART 2

ENVIRONMENTAL COMPLIANCE AUDIT, JILT COAL MINE

2.1 DESCRIPTION OF SITE AND ACTIVITIES

As mentioned earlier, Jilt CM is located in the western area of Gorj County. The Jilt CM has two working areas: Southern Jilt and Northern Jilt. Figure 2.1 shows the layout of both exploitation sites.

The main activity at the Jilt CM is lignite exploitation. It is an open pit exploitation organized on two leases forming two quarries: the Southern Jilt and the Northern Jilt. The entire production of the Jilt CM, 6 million tons of coal/year, is delivered to a single consumer: the Turceni steam power plant.

2524 people work on site, out of which:

- 2180 workers;
- 344 technical staff, management and foremen.

1,500 people work at the Southern Jilt quarry, and the rest work at the Northern Jilt quarry.

The working schedule is 5 days/week and is divided in 8 hours shifts (600 persons/shift), that means 40 hours/week .

The site is powered by the National Energetic System through 6 kV medium voltage stations. All facilities and equipments are supplied with electric energy.

The coal mining activities consist of:

- Excavation:
  - Soil uncovering;
  - Coal mining;-
- Sterile and coal storage;
- Sterile and coal transportation by Belt conveyors .

The coal deposit in the mining lease includes 16 layers, out of which just the first 6 layers are suitable for economic exploitation.

- Total area: 1800 ha.
- Penetration depth: 210 m (designed depth: 195 m – the difference is due to the angle of bedding).

The excavation operations include:

- Uncovering of the superficial layer;
- Excavation of coal – sorting is done by selective excavation;
- Sterile and coal consecutive excavations on terraces (Figure 2.2.)

These operations assure the coal sorting in the mining area.

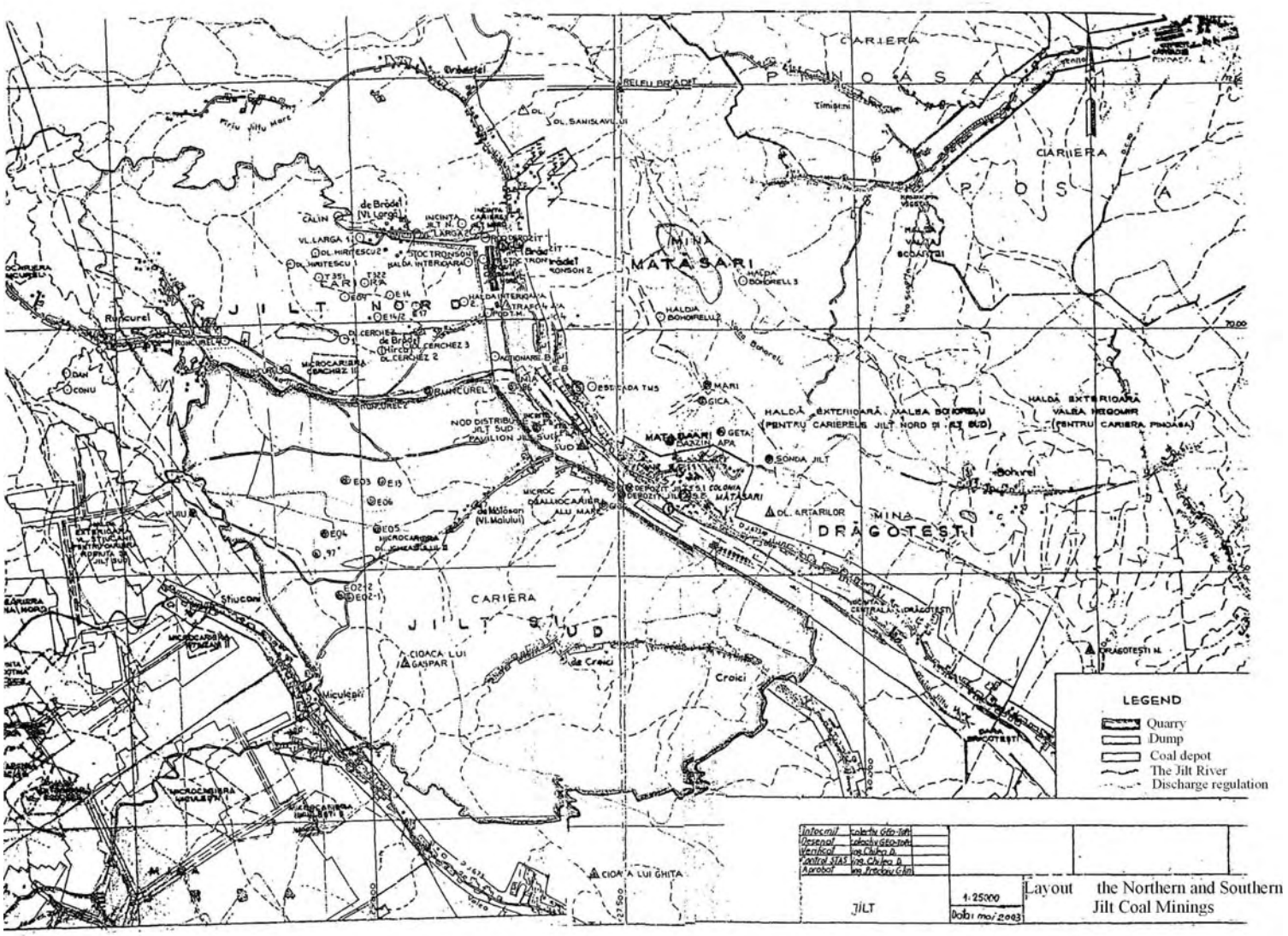

Fig. 2.1 Layout of the Jilt CM

Fig. 2.2 General view of the excavation area in the Southern Jilt quarry.

Fig. 2.3. General view of the excavation area at the Northern Jilt quarry.

Sterile and coal storage

The operation ensures separate storage of the in two components:

- Coal is temporarily stored in two coal storages, one for each quarry, and then it is loaded in railcars and delivered to beneficiary. The loading operation also includes secondary milling operations for crumbling.
- Sterile material is disposed in two dumps:
  - The Bohorelu outer dump where sterile material used to be stored at the beginning of excavation work and where storage operations continue today; disposal in Bohorelu dump will be discontinued .
  - The inner dump is located inside the quarry and builds up as the exploitation goes forward. The inner dump is the fill used for soil recovery, and restoration to private use. Disposal in the inner dump increases as disposal to the external dump decreases.

Fig. 2.4 Sterile storage in the inner dump.

Sterile and coal transportation on Belt conveyors

The coal is transported by rubber belt conveyors, h 1400, 1600, or 1800 mm wide, to the storage area. All transportation systems are electrically operated. The transportation speed is 6 m/s.

Fig. 2.5 Belt conveyors.

Equipment and facilities

Work is carried out using the following equipment and facilities:

- For excavation – 12 excavators with rotary pans, electrically operated, each having a power of 2 MW;
- Electrically-operated dumpers with a loading capacity of 6500 m^3/h and a 90 m long arm;
- Belt conveyors 1400, 1600, and 1800 mm wide, having a total 63 km length (35 km at the Southern Jilt quarry and 28 km at the Northern Jilt quarry);
- Medium power transformer stations;
- Other auxiliary facilities.

Operation

The work at quarries started first at the Southern Jilt quarry in 1977, and then, at the Northern Jilt quarry, in 1982.

The process flow at both quarries is shown in Figures 2.6 and 2.7. The excavated materials – sterile and coal – are selectively transported to the distribution points and directed to coal storages, and the inner and the outer dump.

The uncovering ratio is 7 :1 m^3 sterile/ton lignite. Thus, for a production capacity of 6 million tons/year, a volume of 42 million m^3 of sterile/year is handled. This ratio decreases to an average value of 6,5 m^3 sterile/ ton lignite for all layers.

Other secondary operations, such as current repairs, maintenance, food supply were externalized to specialized companies.

The operating process results in:

- The modification of the local relief and of the natural scenery;
- The change of the natural habitat;
- The artificial rebuilding of the former exploitation areas;
- The change of the quality of soil;
- The modification of the structure of ground waters and the formation of other aquifers.

2.2 AUDIT FINDINGS

The audit included a detailed analysis of each activity and a general assessment of the environmental impact of the mining site. The results of the audit were grouped as follows:

- Air emissions report;
- Analysis of water management;
- Analysis of soil pollution;
- Analysis of waste management;
- Analysis of noise and vibrations;
- Analysis of other environmental aspects (liquids storage, risk of accidental spills, asbestos, PCB, health and safety issues);
- Analysis of the existing permits;
- Assessment of environmental non-compliances;
- Report on findings.

2.2.1. Air emissions

The air emission sources are the following:

- Excavators (when uncovering the soil, or excavating sterile or useful material coal);
- Dumpers – disposal of sterile;
- Belt conveyors: the movement of the conveyor belts and the wind blow coal particulates into the environment;
- The coal storage where the wind blows particulates;
- Local infrastructure, through rising of particulates by vehicles.

PROCESS FLOW SHEET
AT THE NORTHERN JILT QUARRY
2004

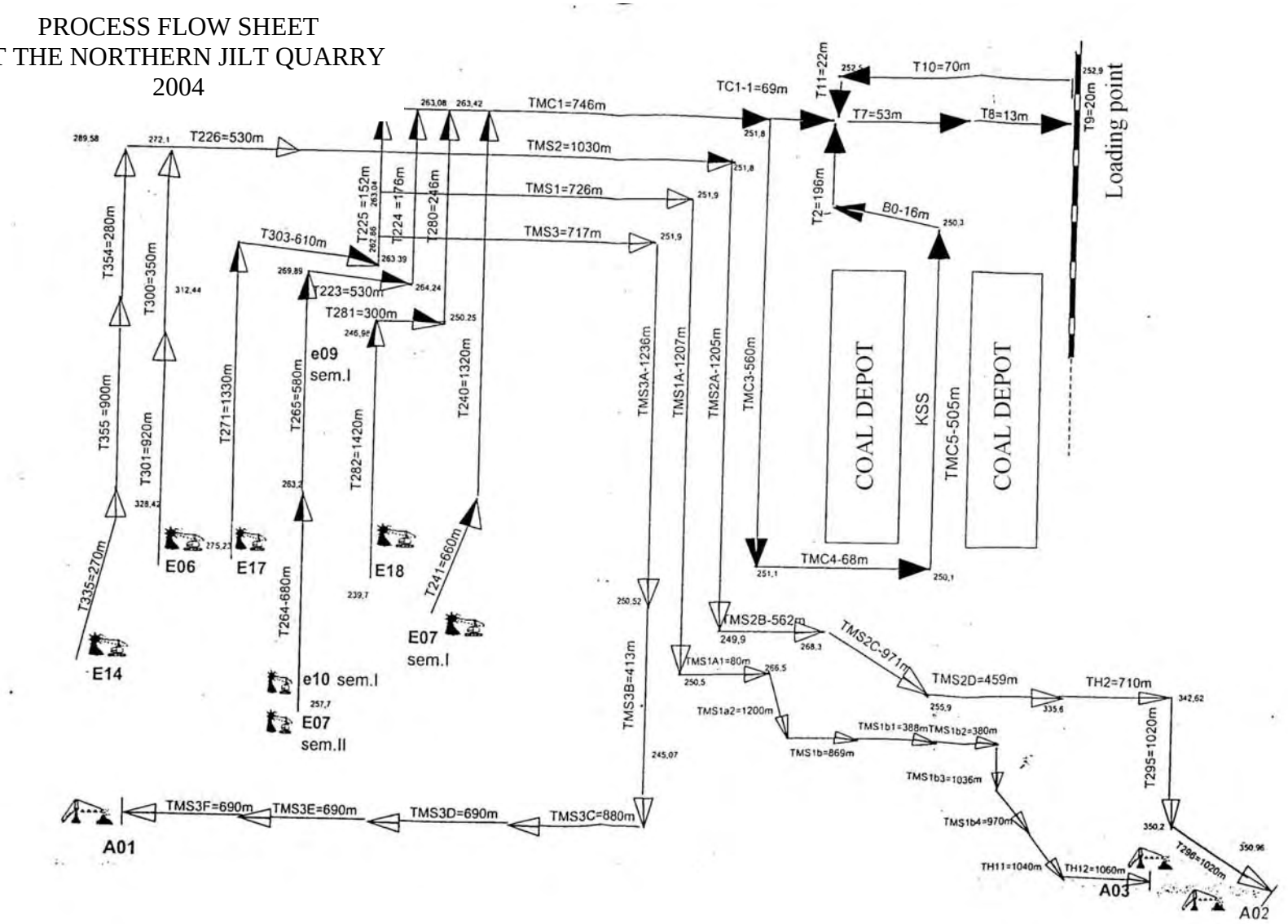

Fig. 2.6 The Northern Jilt Quarry.

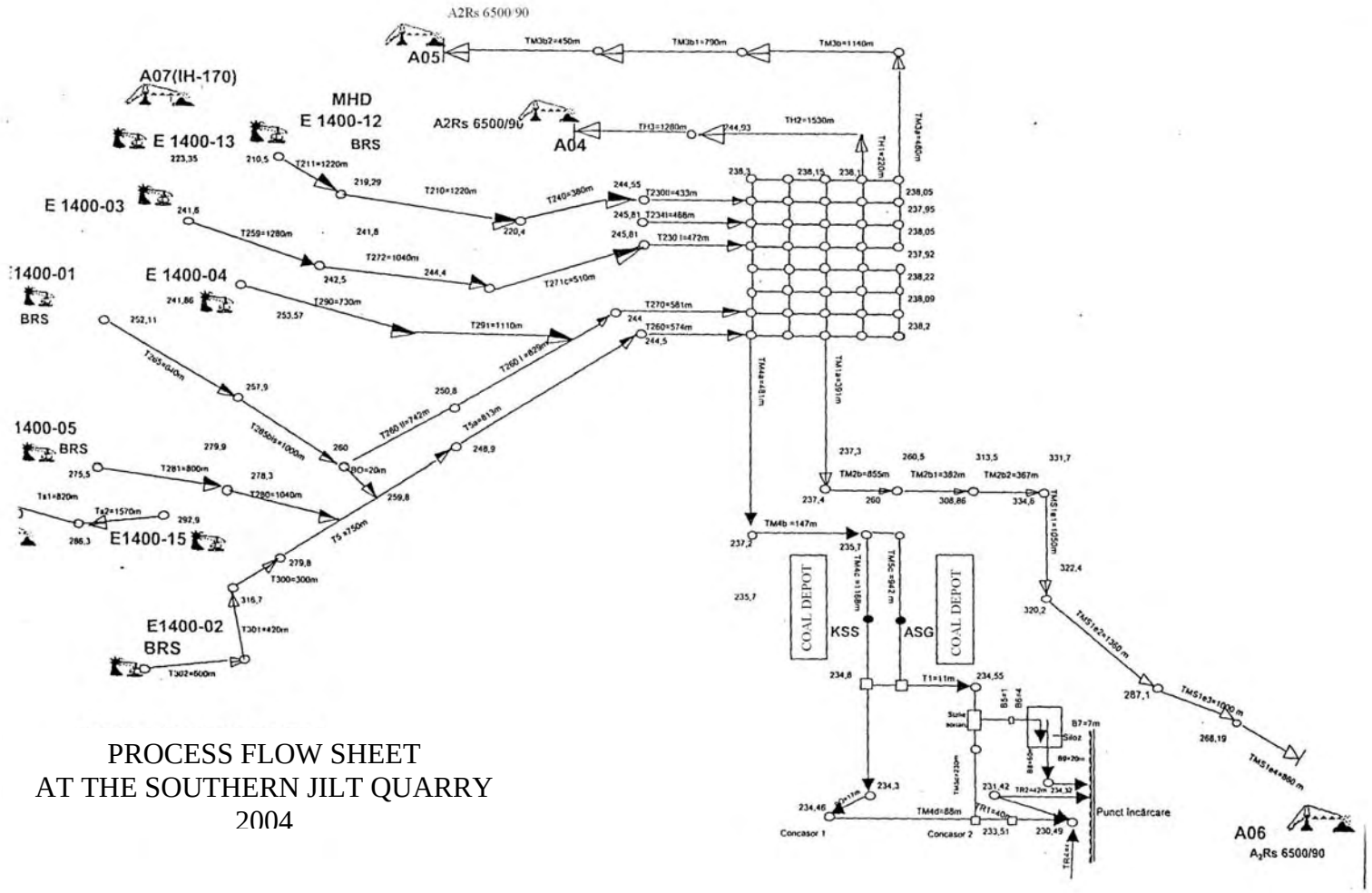

Fig. 2.7 The Southern Jilt Quarry

Pollutants released into the atmosphere:

- Suspended particles, possibly inspirable particulates (PM 10, PM5);
- Sedimented particulates;
- Exhaust gas emissions from transportation means, containing CO, CO_2, NO_x, SO_2 and smoke.

Location of emission sources

- The excavators and the dumpers generate emissions inside the quarry (Fig.2.8), and at the Bohorelu dump, outside the residential area;
- Belt conveyors are linear emission sources that cross the residential area;
- Coal storages located close to the residential area;
- The infrastructure that crosses the perimeter of localities.

Fig.2.8 Particulate emission inside the dump.

The previous reports [1], [2] highlighted the following:

- Emissions from the process occur inside the quarry and have no impact on residential area;

- Most of the particulates sediment in the neighborhood of emission sources, as shown in Figure 2.8.
- Emissions from the excavators and dumpers may impact the personnel's health. This issue will be discussed later, in another chapter of the report.

The coal storages are emission sources with environmental impact, because the wind blows the particulates into neighboring residential areas.

The environmental authorities established two monitoring points, one for each of the two storages:

- At about 30 m from the coal storage of the Southern Jilt quarry, on the premises of the Stoichitoiu family dwelling.
- At about 100m from the coal storage of the Southern Jilt quarry, on the premises of the Turturea family dwelling.

Cover panels were mounted at the Southern Jilt quarry to limit the particulates emission . Such panels are not in place at the Northern Jilt quarry. The monitoring results for 2001-2003 are included in Table 2.1.

Table 2.1: Results of monitoring of sedimentable particulates at Jilt mine.

Year	Sampling point	Measured concentrations (g/m^2/month)												MAC G/m^2/ month
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
2001	Turturea							7.04	30.2	32.9	15.4	24.1	10.5	17
	Stoichtoiu							32.9	23.9	31.5	30.9	27.9	24.5	
2002	Turturea	19.6	27.9	10.3	35.8	15.9	102	21.4	19.0	12.5	18.6	12.7	10.1	17
	Stoichtoiu	21.6	43.6	34.9	26.1	44.5	23.4	27.0	36.4	18.4	25.3	18.7	10.9	
2003	Turturea	14.8	5.3	20.9	12.3	9.5	17.8	25.4	21.3	25.0	15.2	15.4	52.3	17
	Stoichtoiu	15.7	4.6	54.4	19.4	39.3	29.9	24.3	15.9	20.9	39.8	20.7	32.7	

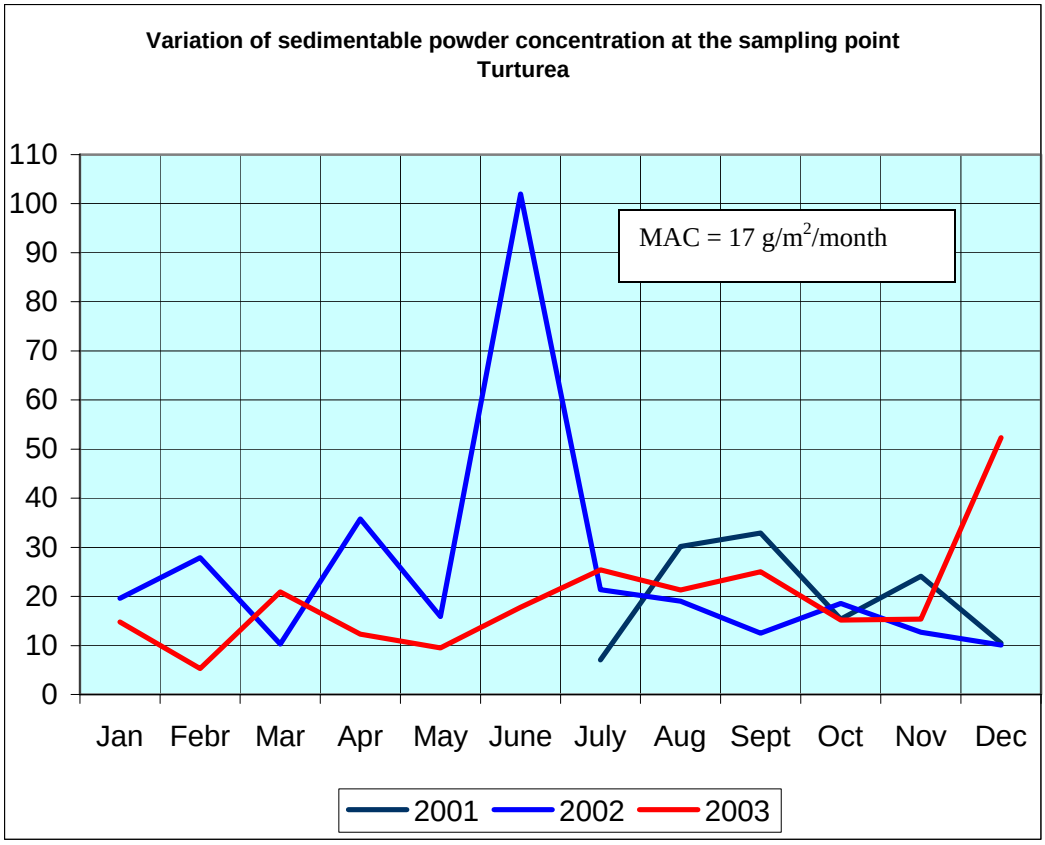

Fig. 2.9 Variation of sedimentable particulates concentration at the sampling point Turturea– Northern Jilt quarry

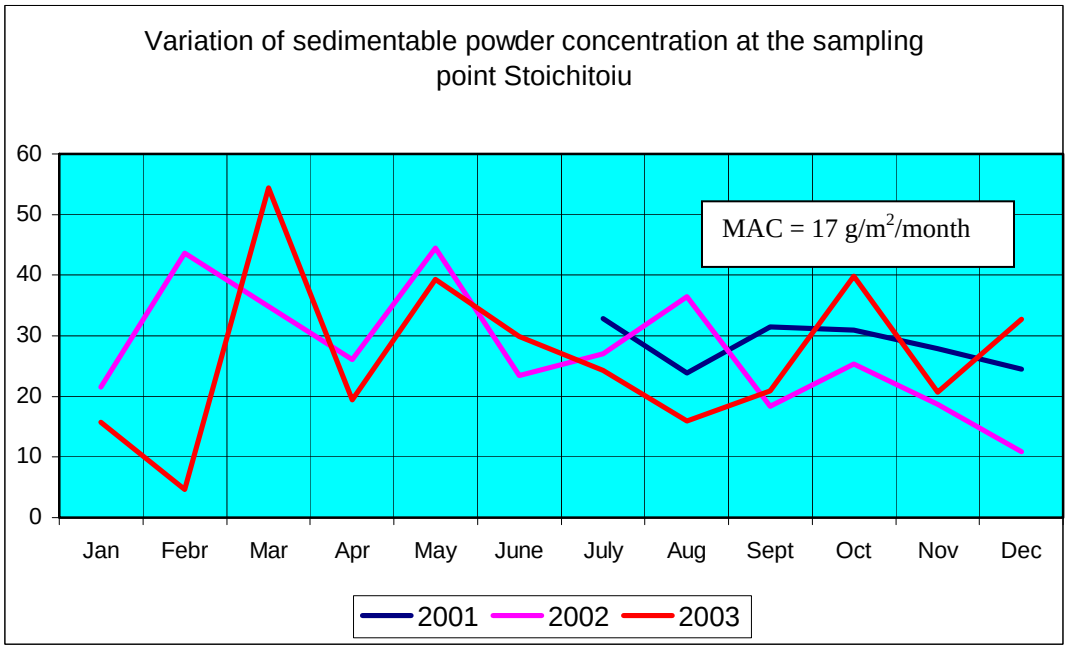

Fig. 2.10 Variation of sedimentable particulates concentration at the sampling point Turturea

The graphics in the figures 2.9 and 2.10 display frequent exceedings of the maximum allowable concentrations (MAC) at both monitoring points.
The average yearly concentrations at the two sampling points are presented in Table 2.2.

Table 2.2 Average yearly concentrations at the Northern and Southern Jilt coal storages

Sampling point	Average yearly concentrations [g/m^2/month]			MAC [G/m^2/month]
	2001	2002	2003	
TURTUREA-NORTHERN JILT	20	25.5	19.6	17
Stoichitoiu-Southern Jilt	20.6	27.6	26.5	

We draw the following conclusions from Table 2.2:

- Allowable values are continuously exceeded at both sampling points;
- The panels for limiting the emissions at the Southern Jilt loading point have limited efficiency (the sampling point is 30 m far from the emission source, while that for the Northern Jilt is 100 m far). The reason why the panels are ineffective, is that they are not tight and let particulates blow through.

The findings of the impact study conducted by ISEMEX Petrosani

With reference to air emissions, the study conducted by ISEMEX Petrosani outlined that:

- The emission source at the railcars loading point of the Southern Jilt quarry, in Matasari village, impacts the residential area over a 150-230 m radius
  - Within the 0…150 m distance , the particulates concentration exceeds the intervention limit of 0.5 mg/m^{3}for the ambient level
  - Within the 150…230 m distance , the particulates concentration exceeds the warning limit for the ambient level (0.35 mg/m^3)
- The measurement for sedimentable particulates confirmed the previous results. Concentrations at both points exceed the allowable limit of 17 g/m^2/month.

The findings of the monitoring conducted by EPA Gorj

EPA Gorj, through the Integrated Environmental Monitoring Department, has monitored sedimentable particulates emissions at the two points mentioned above. The conclusions of this monitoring are the following:

- The allowable concentration of 17 g/m^2/month has been exceeded 7 times in 2002, and 5 times in 2003 at the Northern Jilt point. One of these values exceeds 6 times the UAC.
- The allowable concentration has been exceeded 11 times in 2002, and 9 times in 2003 at the Southern Jilt point.
- We should note again that Southern Jilt monitoring point is 30 m from the source, while Northern Jilt monitoring point is 100 m away from the source.

General recommendations

- Undertake serious actions to reduce particulates emissions at the railcar loading point, which have a direct environmental impact.
- Examine the option of completely enclosing the loading area.

2.2.2 Water management

The Jilt CM is a water consumer and a source of wastewater discharge.

Water consumption
Water is used for household consumption and to for spraying the coal in the coal storages. Water is drawn from the reservoir and the treatment plant of Godinesti, 40 km upstream. Water is brought to the quarry through a pipe.

Wastewater discharge
The site discharges domestic and industrial wastewaters into the Jilt River. The quality of wastewater effluents is regulated by NTPA 001/2002 Norm, approved by the Government Decision 188/2002.

The sources of wastewater are the following:

- Domestic discharges from social and administrative buildings;
- Industrial effluents from the quarries (ground or rain waters)

Waste water collection and treatment system
Wastewater is pumped by pumping stations to open collecttion channels then to the main open channel collector, and discharged, finally, to the Jilt river.

Eventual exfiltration or rainwater drained from the sterile dumps is collected in the collection channels, located at the basis of the dumps, and directed to the settling ponds and then to the main collector. The collecting channels and the main collector are concrete lined.

The following wastewater treatment units exist:

- Septic tanks with two compartments for domestic wastewater;
- Mud-settling ponds collect industrial residual water from quarries and after solids were settled out, water is pumped to the main collector.

Effluent flow is comparable to that of the Jilt creek. Consequently, there is no dilution. Sludge collected in the mud-settling ponds and channels is periodically removed. The environmental guard inspectors (commissars) recommended periodic cleaning of the channels and of the main collector. of. Sludge is stored in the inner dumps.

Discharged water volumes are monitored by keeping track of the pump flows and their operating time. The result of the measurement may be quite accurate, but it is dependent on the frequency with which operating time records are registered.

The Water Management Agency Jiu Craiova, the local branch of the National Authority Apele Romane, through the SGA Gorj laboratory, monitors the quality of the wastewaters. The monitoring schedule includes taking momentary samples once a month.

The results of wastewaters quality tests are shown in Table 2.3 for the Northern Jilt quarry, and in Table 2.4 for the Southern Jilt quarry.

Table 2.3 Quality indicators for industrial waste waters discharged from the Northern Jilt quarry

Tests completed by the laboratory of the S.G.A. Gorj

Quality indicators	MU	Month						MAL NTPA 001
		April 2003	June 2003	July 2003	Aug. 2003	Sept. 2003	Oct. 2003	
pH	pH	7.92	8.07	7.61	7.67	6.77	7.20	6.5…8.5
CCOCr (COD)	mg/l	13.00	24.00	22.00	22.00	18.00	28.00	70
Fixed residue	mg/l	522.00	406.00	321.00	108.00	674.00	568.00	
Chlorides	mg/l	13.50	10.60	10.60	9.94	6.40	12.00	500
Sulphates	mg/l	118.60	94.00	72.00	26.80	120.00	136.00	600
Calcium	mg/l	80.00	104.00	89.60	25.60	148.80	131.20	300
Magnesium	mg/l	27.40	22.08	17.90	5.32	29.50	24.20	100
Phenols	mg/l	0.03	0.06	0.08	0.06	0.06	0.08	0.3
Total iron	mg/l	0.52	0.16	0.18	0.18	0.20	0.14	5
SUSPENDED SOLIDS	mg/l	**60.00**	**36.00**	**47**	**42.00**	**42.00**	34.00	35
Quality indicators for domestic waste waters discharged from the Northern Jilt quarry								
pH	pH	6.80	6.99	7.28	7.19	6.28	7.43	6.5…8.5
CBO_5 (BOD)	mg/l	15.20	17.60	15.60		17.48	17.40	20
CCOCr (COD)	mg/l	2.70	38	34.00	39.00	44.00	42.00	70
Fix residue	mg/l	192.00	153	134.00	166.00	122.00	159.00	
Chlorides	mg/l		12.40	10.60	24.80	13.80	13.50	500
Sulphates	mg/l	36.30	29	23.00	31.00	25.00	30.00	600
TOTAL NITROGEN	mg/l	6.46	3.6	3.48	3.20	3.60	3.20	10
Extractibles	mg/l	0.008						20
Total phosphorous	mg/l	0.24	**1.80**	0.73	1.00	0.66	0.20	1
Detergents	mg/l	0.01				0.08		0.5
SUSPENDED SOLIDS	mg/l	**53**	32	**53**	35	**53**	36	35

Table 2.4 Quality indicators for industrial waste waters discharged from the Southern Jilt quarry

Tests completed by the laboratory of the S.G.A. Gorj

Quality indicators	U.M.	Month						UAL NTPA 001
		April 2003	June. 2003	July 2003	Aug. 2003	Sept 2003	Oct. 2003	
pH	pH	6.75	7.37	7.83	7.52	6.67	7.15	6.5…8.5
CCOCr (COD)	mg/l	19.00	20.00	21.00	20.00	18.00	22.00	70
Fixed residue	mg/l	456.00	226.00	242.00	126.00	110.00	97.00	
Chlorides	mg/l	19.45	10.60	11.69	10.65	9.90	5.70	500
Sulphates	mg/l	120.00	14.00	31.00	18.00	20.00	19.00	600
Calcium	mg/l	128.40	49.60	51.20	28.00	28.00	24.00	300
Magnesium	mg/l	15.90	19.30	16.90	6.40	3.40	4.80	100
Phenols	mg/l	0.05	0.04	0.06	0.06	0.06	0.06	0.3
Total iron	mg/l	0.40	0.12	0.16	0.16	0.16	0.10	5
SUSPENDED SOLIDS	mg/l	**58.00**	30.00	**38**	**40.00**	30	32	35
Quality indicators for domestic effluents discharged from the Southern Jilt quarry								
pH	pH	6.87	7.17	6.83	7.19	7.20	6.92	6.5…8.5
CBO_5 (BOD)	mg/l	13.80	18.44	17.64		18.48	**20.25**	20
CCOCr (COD)	mg/l	27.00	40.00	38.00	44.00	46.00	46.00	70
Fixed residue	mg/l	226.00	179.00	178.00	129.00	406.00	134.00	
Chlorides	mg/l		14.20	12.76	13.40	12.00	7.00	500
Sulphates	mg/l	40.60	15.00	18.00	20.00	108.00	22.00	600
TOTAL NITROGEN	mg/l	3.72	5.34	5.70	4.26	4.10	3.80	10
Extractable subst.	mg/l	0.006		0			0	20
Total phosphorus	mg/l	0.20	**1.12**	1.0	0.76	0.44	0.33	1
Detergents	mg/l	0.01				0.08	0	0.5
SUSPENDED SOLIDS	mg/l	**49.00**	26.00	**45.00**	32	33.00	35	35

Note: The values in bold letters highlight exceeding maximum allowable limits.

Review of measurement results shown in Tables 2.3 and 2.4 show frequent exceedings of the allowable values for suspended solid materials. The causes for this could be the following:

- For industrial effluents:
  - Clogging of settling dumps;
  - Deposits on the collecting channels carried away by wastewaters;
  - Abundant rainfall.

- For domestic waste water
  - Sediment in excess in the septic tanks;
  - Uncertainty of laboratory tests.

No mentions are made regarding bacteriological loading of domestic wastewater. The septic tanks lack disinfection systems.

Indicators of wastewater discharged from the Northern and Southern Jilt quarries generally comply with the legal stipulations of NTPA 001, except for suspended solids.

General recommendations
Recommendations for water discharge management are, as follows :

- Chapter 2.3 includes the results of a survey for improving wastewater treatment at source, based on a unique industrial water management concept applied at both open pit mines;
- Development and implementation of a plan for periodic cleaning of the collecting channels to remove sludge deposits, in order to prevent clogging;
- Initiate preventive actions in order to reduce bacteriologic load of domestic waste water, and avoid the impact on the Jilt river and on potential domestic use downstream;
- Improvement of waster water treatment in settling tanks.

2.2.3 Soil

Open pit mining has a significant impact on affected soil 1800 hectares of land were affected in the Jilt CM, out of which 1590 hectares of agricultural land and 210 hectares of woods. Deforestation and soil removal have disturbed the whole ecosystem in the area. The hydrographic system has also been changed. Aquifers were changed and artificially reshaped by sterile dumping.

Exploitation has two main activities impacting soil:

- First: uncovering (soil removal), and excavation of sterile layers;
- Second: sterile storage in inner and outer dumps, and soil remediation.

Sterile storage is part of the production process and the storage costs are included in the cost of the delivered product – coal.

Remediation works are included in the category of environmental rehabilitation works in the environmental compliance schedule and in the annual investment plans according the requirements of the common Order nr.22740/21 Oct. 2001 of the MEWM and of the National Agency for Mineral Resources .

Land remediation works consists of:

- Land leveling ;
- Fertilization;
- Ploughing,

- Sowing;
- Maintenance.

Remediation works aim at:

- Restore vegetation;
- Stabilize soil against earth slides and rainfall washing away;
- Prevent and control soil erosion.

The remediation cycle, to recover agricultural land (cleaning-up operations) lasts 3 years (the World Bank recommends cycles of 5 years.)

Remediated land is given back to the local authorities for redistribution to the people that were expropriated. 158 hectares were recovered in 2003: out of which 73 hectares of agricultural land and 85 hectares of sylvan land. The impact of mining on the local communities resulted in the creation of two new villages, to where 200 families have settled. 180 families decided to move to town (Targu Jiu).

The land to be remediated is included in the annual investment plans. In 2004, 35 hectares will be redistributed to the agricultural circuit at Bohorelu dump.

2.2.4. Waste management

Waste generation and management
Wastes generated on the sites are classified as: recyclable such as metal and rubber waste: and not-recyclable, such as sludge in the dumps, sterile from excavations. Wastes are managed globally for the whole site. It is worth mentioning that the site outline prevents implementation of a controlled storage of domestic wastes.

For waste disposal, the Jilt CM has:

- An outer dump for sterile storage;
- Two inner dumps for sterile and domestic wastes storage.

Storage in the outer dump is decreasing, while the inner dumps are going to become the main sterile storages.

The following wastes are generated on site:

- Recyclable waste:
  - Metallic wastes that are temporarily stored, and are processed outside of the site, through UVA Rovinari;
  - Rubber waste from the Belt conveyors , which is temporarily stored. A part of it is recovered and reused (for ex., of 1800 mm wide belts may be re-used as 1400 or 1600 mm wide belts), while ARTEGO Tg. Jiu recycles the rest. Rubber wastes were incidentally stored in the outer dump and some of them were burnt, as reported by the Environmental Guard following inspections.

- Non-recyclable wastes:

    - Sterile from excavation is stored in the Bohorelu outer dump and in the inner dumps. This waste is the basis for the environmental remediation of the land affected by coal mining.
    - Sludge from settling tanks, having a similar content to the sterile, is deposited in the sterile dumps;
    - Other wastes: there are no management and storage control procedures for the Diesel fuel used for washing parts during current repairing;
    - Domestic waste is collected by the Local Sanitation Service and is disposed of together with other domestic wastes in the dump of the Jilt CM.

General recommendations
The following recommendations are made for wastes disposal:

- Improvement of not-recyclable waste management in order to prevent uncontrolled waste disposal;
- Develop and implement procedures to control or eliminate uncontrolled burning of wastes.

2.2.5 Noise and vibrations

Noise and vibrations are typical for a mine site. The main noise sources are the following:

- Excavators and dumpers;
- Belt conveyors;
- Vehicles;
- Loading equipment.

The excavators and dumpers work inside the quarry, far away from residential areas and have no impact on it.

Belt conveyors are the main noise sources when crossing Matasari and Bradet villages.

Specific studies regarding noise indicate that the noise level generated by belt conveyors reaches the level of 80 dB in the close vicinity. The noise becomes louder when belts driving parts get worn out. Romanian standard STAS 10009-82 stipulates 50 dB as the allowable upper limit for noise level inside plants.

Results of monitoring findings by Gorj EPA
On a monthly basis, EPA Gorj monitors noise level at the limit of coal mines premises, in the areas closest to the receptors. The results of the measurements conducted by EPA Gorj are shown in Table 2.5.

Table 2.5: Level of noise generated by Belt conveyors Tests conducted by Gorj EPA				
Measurement area	**Noise level [dB]**			**Allowable limit STAS 10009-82**
	2001	**2002**	**2003**	
Matasari area – Southern Jilt quarry	51.1	64.2	51.7	50
Bradet area – Northern Jilt quarry	58.2	58.6	58.2	

The findings of the Impact Study conducted by ISEMEX Petrosani
ISEMEX Petrosani measured the level of noise in some sensitive points. The findings are shown in Table 2.6.

Table 2.6: Noise measurements conducted by ISEMEX Petrosani

Noise source	**Measurement point**	**Noise level** [dB]	**Allowable limit STAS 10009-82**
Belt conveyors and loading point of railcars , Northern Jilt	At 80 m distance, inside Turturea property	58	50
	On the road, 100 m distance from Turturea property	55 - 56	
Belt conveyors and loading point of railcars, Southern jilt	At 30 m distance from Stoichitoiu property	64	
Main Belt conveyors from Southern Jilt - Bohorelu	At 8 m distance from Popescu property	67	

Measurements performed by both organizations confirmed existence of a noise impact on the residential area and that the noise sources are:

- Belt conveyors, located close to residential area;
- Worn-out facilities, before current repairs.

General Recommendations

- Development and implementation of surveillance and emergency preparedness plan for early detection of deterioration and for promptly repairing the Belt conveyors;
- Conduct study regarding the possibility to seal off Belt conveyors in order to prevent impact of noise in the impacted area.

2.2.6 Other issues

Liquid storage
Each quarry has tanks for lubricating oil storage. The storage capacity is 18-30 metric tons. Over- ground tanks are laid down on sand beds. The sand is replaced in case of leakage.

The Diesel fuel used for driving the welding groups and for washing parts is stored in a tank having a capacity of 10 metric tons. The metallic tank was constructed in 1980 and buried in earth. There is no information on its technical status. The tank presents a potential environmental risk.

Risks of potential accidental discharges
Potential leakages may occur from the storage of oil and Diesel fuel in tanks, due to:

- The lack of a retention dumps for the tanks;
- Improper manipulation of liquids, disregarding environmental requirements;
- The lack of periodic control on the integrity of the tanks.

The recommendations for these environmental issues are the following:

- Placement of the tanks in retention dumps:
- Implementation of procedures for liquid manipulation using adequate equipment;
- Implementation of a monitoring program for checking the integrity of the tanks.

Use of asbestos
Asbestos is not used, as declared by the interviewed persons.

PCB
The 6 kV medium power transformer stations and the electric energy facilities on site are equipped with capacitors. There is no information regarding PCB content in oil.

General recommendations:

- Development of a detailed inventory of all transformers in terms of power, year of manufacturing, manufacturer, and investigation for PCB content;
- In case PCB-contaminated oil is found, the transformer(s) shall be replaced during shut-down periods and an authorized company shall be called to collect such oil.

Health and safety issues
Dust, noise and vibrations could affect the health of the personnel working in the process. They work for a limited time in the production area and the cabins of the vehicles are protected against noise and dust. The toxicological tests of the working environment, conducted by the Public Health Department of Gorj established the following concentration values:

- Northern Jilt quarry:
  - Concentrates mill station: 9-13 mg/m^3
  - In the cabin of the excavator: 3-6 mg/m^3
  - On the surveillance track of the Belt conveyor: 9 -12 mg/m^3
- Southern Jilt quarry:
  - At the return station: 12-14 mg/m^3
  - On rotating platforms: 12-15 mg/m^3

Appendixes 14 and 15 to the General Worker Safety Norms,, issued by the Ministry of Labor and Social Protection in 1996, set the allowable limit to 10 mg/m^3.

The work environment complies with the norms inside the cabins, but does not comply in open areas, close to the Belt conveyors surveillance area. The personnel working in the surveillance areas should wear protective equipment. During the last years, the company did not record any cases of occupational diseases in its statistics.

General Recommendation
The workers should be equipped with protective equipment, and instructed to wear it.

2.2.7 Permits and inspections

The Jilt CM had an environmental permit, obtained while it was part of the former organization - Oltenia National Lignite Company (CNLO). The permit expired in December 2003. As the Turceni Energetic System has been reorganized, the Jilt CM shall have to apply for and obtain a new permit according to the new organizational structure.

The company holds the water management permits no. 43/2003 for Southern Jilt and no. 42/2003 for Northern Jilt. These permits are valid until 1st of August 2005.

The Environmental Guard - the environmental authority for inspections – inspects the Jilt CM 2 -3 times each year. Following inspections conducted between 2001 – 2003 43 measures were imposed by the environmental guard for implementation, out of which 37 were implemented, 5 were partially accomplished, and one of them has not been accomplished at all. The not accomplished measure deals with “the recovery of fertile soils”. Inspections have also confirmed air quality non-compliance at Turturea and Stoichitoiu monitoring points, and deviations from the quality requirements of wastewater effluents to the Jilt River.

2.3 ASSESSMENT OF ENVIRONMENTAL NON-COMPLIANCES

2.3.1 Methodology

Assessment of the required compliance measures was conducted according to the environmental regulations in Romania and having in view the possible evolution of the process of harmonization with the European Union’s environmental legal framework.

The assessment methodology for environmental non-compliances follows:

- Review of each environmental media, for all activities including:
  - Air emissions;
  - Water: use, consumption, treatment and discharge;
  - Wastes: type, nature, quantity and disposal path;
  - Noise;
  - Land: degradation, remediation and clean-up operations;
  - Other issues: working environment, presence and use of asbestos, PCB, general workers’ health and safety issues.

- The review considered overall management of the site which enabled development of recommendations for environmental management. The recommendations and the assessments include measures, applicable both short-term and long-term aimed at straightening environmental legal non-compliances, as follows:

    - Short-term actions (0 to 2 years) – to eliminate immediate environmental risks and to reduce emissions at source;
    - Long-term actions (3 to 7 years) to comply with all legal requirements.

The main advantage, from cost point of view, resulting from implementation of the compliance measures in two stages, long-term and short- term, are:

- Reasonable cost/environmental benefit ratio;
- Schedule activities according to European standards.

Non-compliances are assessed as follows:

- Quantitatively, as a result of existing measurements, analysis, and environmental balances;
- Qualitatively, related to existing technologies, and practices.

Recommendations were drawn up for each instance ofenvironmental non-compliance. based on background experience and existing technical solutions with reasonable implementation costs. All recommendations were evaluated from the cost point of view, based on estimates considering current costs in Romania and taking into account a potential opening of the market, as a result of the EU accession.

2.3.2 Summary of the results at the Jilt CM

Findings are summarized in tables. Table 2.7 includes the actions and costs estimates for immediate and medium term compliance.

Table 2.7: A report on the costs of environmental compliance activities for the Jilt CM

Environ-mental media	Description of proposed actions	Costs of short-term compliance EURO	Costs of medium-term compliance EURO
Air	Reducing particulate emissions at the Northern Jilt loading point	15,000	100,000
	Reducing particulate emissions at the Southern Jilt loading point	15,000	100,000
	Reducing particulate emissions at the Belt conveyors system in the area crossing Matasari	15,000	30,000
	Reducing particulate emissions at the Belt conveyors system in the area crossing Bradet	15,000	30,000
	Implementing a procedure to mitigate particulate emissions at coal storages	500	

	Setting up of a vegetal protection screen against surface emission sources.	1,000	
Water	Improvement of water treatment process in settling ponds	20,000	
	Improvement of domestic water treatment process	10,000	
	Periodic cleaning of collection channels and settling ponds	5,000	
	Monitoring program of wastewater discharges	5,000/year	
Soil	Developing a soil remediation plan scheduled over several years	500	
	Remediation of affected land according to the compliance schedule*	400 EURO/ha	700-1,800 Euro/ha
	Works to control and prevent soil erosion *		2,500 Euro/ha
	Rehabilitation of some of the residential areas and of the social utilities		Assessments depend on actual situations.
Wastes	REDUCE DEPOSITING STERILE AND COVERING THE STERILE STORAGE IN BOHORELU OUTER DUMP		Rehabilitation of terrains 35,000 – 90,000 Euro
	Improve waste management through complete recovery of rubber wastes and elimination of storage in dumps	1,000	
	Domestic waste management in cooperation with legal authorities		
	Recovery and disposal of liquid wastes (spent oil)	2,000	
Noise	Reduce the noise level at the loading point Northern Jilt		Including also the measurements to reduce particulates emissions
	Reduce the noise level at the loading point Southern Jilt		
	Reduce the noise level at the Belt conveyors system in Matasari village	10000	
	Reduce the noise level at the Belt conveyors system in Bradet village	10,000	
	Implement a periodic checking plan of the transportation means to prevent operating failures	1,000	

Other environ-metal issues	Implement retention basins under the tanks for liquid storage.	15,000	
	Check tightness of the Diesel fuel storage tank	500	
	Diagnosis of transformers and capacitors, and collection and replacement of PCB containing oil, if necessary	5,000	
	Obtain environmental permits and agreements for extending the mine	5,000	10,000

* The costs are in accordance with World Bank estimates for remediation of lands affected by mining activities. These costs depend upon local situation, land configuration and use (agricultural or forestry).

PART 3

ENVIRONMENTAL COMPLIANCE AUDIT, DRAGOTESTI COAL MINE

PART 3

ENVIRONMENTAL COMPLIANCE AUDIT, DRAGOTESTI COAL MINE

3.1 DESCRIPTION OF SITE AND ACTIVITIES

As aforementioned, the Dragotesti CM is located in the western area of Gorj County, to the south of Matasari village. Figure 2.1 shows the layout of the exploitation. Dragotesti CM has two mines: Tehomir mine, still in operation and Timiseni mine, presently shut-down.

The main activity at the Dragotesti CM is underground lignite mining, at a production capacity of 360,000 tons of coal per year, delivered to Turceni thermal power plant.

There are 351 people working on site, out of which:

- 327 workers
- 24 technical staff

300 people of the personnel work in shifts.
The working schedule is 5 days/week, 8 hour shifts, (40 hours/week).

The site is supplied with electric power by the National Energetic System through 6 KV medium power stations. All facilities and equipments are supplied with electric energy.

The coal mining activities consist of:

- Coal extraction:
  - Digging openings – investment work
  - Preparatory digging for extraction
  - Coal ore mining
- Transportation of coal, by belt conveyors, to the ground level
- Coal storage
- Underground transportation of materials by LDH 45 mine locomotives
- Loading coal in railcars
- Maintenance, repairs of mechanical devices

In the mining area, the coal ore is located 80-100 m deep, and the exploitation depth is 60-80 m. The thickness of the layer is 3.2-4.2 m. As the specific heat power is 1,965 kcal/kg, the coal has a good quality. The exploration in layers does not require later sorting.

Coal extraction and transportation
Coal extraction uses the following equipment:

- Mechanical systems with support: 2 pcs.
- Combined cutter loader: 2 pcs.
- Entry driving machine: 3 pcs.

The coal is dislocated by detonating blasting material. Blasting material for 5 days is temporarily stored in niches. The width of the active face is 80-100 m. The coal is transported to the surface and then to the storage by eleven underground Belt conveyors and 2 above ground belt conveyors. The belts are 1 m wide and travel at a speed of 2 m/s. The total length of the belts is 4.5 km.

Coal storage

Usually, coal is directly loaded into railcars. Depending on beneficiary's schedule, in case there is no scheduled demand, coal is temporarily stored in a buffer storage. The capacity of the buffer storage is of 40,000 tons. The storage assures a limited coal stock at the ground level.

The storage is provided with storage crushing, crumbling and loading equipment. The prepared coal is transported to the belt conveyor by a bulldozer. Then, coal is loaded on the railcars and supplied to the beneficiary. A winch moves the railcars towards the loading position.

Fig.3.1 Ground level coal storage

Fig.3.2 The loading point of the railcars .

3.2 AUDIT FINDINGS

The audit comprises detailed analysis of each activity and an overall assessment of the environmental impact of the site. The audit findings deal with the following subjects:

- Air emissions
- Water management
- Soil pollution
- Waste management
- Noise and vibrations
- Other environmental aspects (liquids storage, risk of accidental discharges, asbestos, PCB, health and safety issues)
- Existing permits
- Assessment of environemntal non-compliance
- Summary of findings

3.2.1. Air emissions

The air emissions sources are the following:

- Inside the mine, underground, from:

  - Entry driving machines
  - Combined cutter loaders
  - Belt conveyors

- Outside the mine, above ground:
  - Belt conveyors: the movement of the Belt conveyors and the wind both contribute lift coal particulates into the air
  - The coal storage, where the wind blows the particulates
  - Local infrastructure, through stirring up of particulates by vehicles
  - The ventilation devices that evacuate air from the underground

Ventilation is ensured by two main stations and eleven partial ventilation fans connected to the main ventilation systems.

Pollutants released into the atmosphere:

- Suspended particles, potential inspirable particulates (PM 10, PM5)
- Sedimentable particulates
- Mining gas, mainly CO_2
- Exhaust gas emissions from transportation means, containing CO, CO_2, NO_x, SO_2 and smoke
- Gases resulting in the underground from coal dislocating blasts: CO_2, CO, N_2 and C

Location of emission sources

The emission sources are located outside the residential area. Air discharge pipes are located far away from the residential area. The site of the coal storage is located close to the railroad, at a great distance from the living perimeter. This locations are favorable from an environmental protection point of view.

The results of the impact study conducted A.F. Patrutoiu I.

A.F. Patrutoiu I carried out the environmental balance in 2003. The measurements performed at the outlet of the ventilation system are summarized in Table 3.1.

Table 3.1: Gas and particulates emissions at outlet of the ventilation system

Results of the environmental balance conducted by A.F. Patrutoiu I.

Source	Air flow [m3/h]	Pollutant	Concentration of emission [mg/m^3]
BORING	32,160	Particles < 30µm Particles > 30µm Particles < 10µm	10.00 0.30 0.16
Explosion	32,160	CO NO_x CH_4 H_sS	2.30 1.17 0.013 0.09

		SO_2	0.045
Dislocation, breakage, and transportation	32,160	Particles < 30µm Particles > 30µm Particles < 10µm Particles < 2.5 µm	52.67 2.72 45.99 6.90

A review of the measurement leads to the conclusion that the allowable limit set by Order 592/2002 of the Ministry of Waters, Forests and Environmental Protection has not been exceeded.

The buffer storage and the station of coal loading are other emission sources. Other emission sources are the buffer coal storage and the railcar loading station. The wind blows particulates from the surface of the coal pile in the buffer storage. Coal particles are emitted in the air during loading (Fig. 3.3).

Fig. 3.3 Particulates emission at the railcars loading point.

In order to limit emissions in the loading area, the Belt conveyor is covered by metallic covers (Fig 3.2). As the system is not tight, fugitive emissions occur.

General recommendations:

- Rebuilding of the system protection over the conveyor belt, at the loading point;
- Elimination of fugitive emissions.

3.2.2 Water management

Dragotesti CM is both a water consumer and a source of wastewater discharge.

Water consumption
Water is used:

- For domestic purposes
- To wet the coal in storage places and in the mine
- In the hydraulic devices in mine

Water is drawn from the reservoir and the treatment plant of Godinesti, 40 km upstream of the mine. Water flows through an adduction pipe down to the mine. The water consumption is of 2,500 m^3/month and is metered at the entrance into the premises of the mine.

Wastewater discharge
Domestic and industrial wastewaters are discharged to the Jilt River. The quality of wastewater effluents is regulated by NTPA 001/2002 Norm of the Government Decision 188/2002.

The sources of wastewater are the following:

- Domestic wastewater from social and administrative buildings;
- Industrial waste water from underground seepage.

Wastewater collection and treatment
Water that collects in the mine is directed through collection channels to the settling ponds, located underground. Once settling is complete, water is pumped above ground to a settler and then discharged to the Jilt River.

Existing wastewater treatment units:

- Septic tanks with three rooms, for domestic wastewater (Fig.3.4)
- Industrial waste waters are collected in underground settling ponds and then pumped to an above ground settler (Fig. 3.5), from where they are discharged to the river

Fig.3.4 The septic tank and discharge to the Jilt river

Fig. 3.5 The settling pond

Treated water is discharged from the above ground settling pond through a worn-out pipe, which does not direct water to the discharge point.

The Water Management Agency Jiu Craiova, the local branch of the National Authority Apele Romane, through the SGA Gorj laboratory, monitors the quality of the wastewater. The monitoring schedule includes taking momentary samples once a month. The results of wastewaters quality tests are summarized in Table 3.2.

Table 3.2: Quality indicators for industrial wastewaters discharged from Dragotesti CM
Tests completed by the laboratory S.G.A. Gorj

Quality indicator	M.U.	Month				MAL NTPA 001
		Jan. 2003	Feb. 2003	March 2003	April 2003	
pH	pH	7.37	7.40	7.67	7.19	6.5…8.5
CCOCr (COD)	mg/l					70
Fix residue	mg/l	606.00	471	606	755.00	
Chlorides	mg/l	24.10	15.60	28.71	20.54	500
Sulphates	mg/l	131.20	144.00	160.00	173.60	300
Calcium	mg/l	45.00	16.50	21.80	30.00	100
Magnesium	mg/l	0.08	0.10	0.12	0.08	0.3
Phenols	mg/l	0.18	0.12	0.14	0.18	5
Total iron	mg/l	**87.00**	**60.00**	**71.00**	**66.00**	35
Quality indicators for domestic wastewaters discharged from the Dragotesti CM						
pH		7.34	7.24	7.19	6.68	6.5…8.5
BOD_5	mg/l	18.00	16.00	15.28	13.95	20
(COD)-Cr	mg/l					70
Fixed residue	mg/l	158.00	142	224.00	220.00	
Ammonia	mg/l	1.36	1.31	**2.73**	1.96	2
Total Nitrogen	mg/l		2.60			10
Total phosphorous	mg/l	0.66	0.12		0.67	1
SUSPENDED SOLIDS	mg/l	**42**	**49**	**62**	**38**	35

The analysis of the samples from effluents shows:

- The maximum allowable limit for suspended solids is continuously exceeded in discharged industrial waste waters
- The maximum allowable limit for suspended solids is continuously exceeded and the same limit for ammonia is exceeded incidentally in domestic wastewater discharges

The reasons for these results are:

- Inefficient waste water settling
- Excessive sludge deposits in the settling ponds, due to irregular and/or inadequate cleaning

The same conclusions are to be drawn for the septic tank, where additionally the ammonia indicator is also exceeded, which is not an unusual situation in the case of domestic water. No tests on the bacteriological charge of the water evacuated from the septic tank are performed. Water in the Jilt River may be used downstream as a drinking source for domestic animals. Excessive bacteriological content may inflict disease and cause damages.

Recommendations for managing water discharges:

- Implementation of a periodic cleaning plan, and in a second step, improvement of wastewater treatment, to prevent exceed suspended solids concentration in wastewater discharges;
- Prevent excessive bacteriological charges in domestic wastewater, to avoid the impact on the Jilt and potential domestic use downstream;
- Improve wastewater treatment in settling ponds;
- Monitor discharged wastewater flows.

3.2.3 Soil

Coal mining has the following impact on soil:

- Falling of ground may be caused, subsequent to soil removal in the underground;
- Deposits of coal particulates on the ground;
- Accidental discharge of pollutants on the ground.

Mining activities and potential impact on soil may affect non-residential agricultural and forestry lands. The distance to the residential area is about 300 – 400 m. In order to reduce the mining impact and to prevent collaspe of the overburden, 30 m or 50 m mining pillars are provided in the underground mining area. Specific protecting construction works to prevent landslides were built above ground, includingsupport walls, ditches, and channels to eliminate accumulation of water ponds and to prevent water infiltration of the mine.

Presently, 17.75 hectares of land in Dragotesti village are affected on the territory. The company pays annual compensations. Paid compensations amounted to 175 million lei in 2003.

Major soil pollution by coal particulates deposits occurs in the vicinity of the transportation systems, the coal storage and at the loading point. Rainfall may drive coal particulates into Jilt River.

Fig.3.6 Coal particulates deposit on the soil and near transportation and loading point areas

During the audit, other areas of polluted soil were identified, as follows:

- Oil leakages near the oil storage;
- Sawdust spread on the soil, in carpenter's shop area

Fig.3.7 Spots of mineral oil on the ground near the oil storage and sawdust in carpenter's shop area.

These aspects are isolated and remediation works are simple.

Recommendations regarding necessary measures to prevent soil degradation:

- Rehabilitation of the area affected by mineral oil leaks
- Develop and implement procedures for mineral oil handling to prevent leakages on the soil
- Install retention basins under the storage tanks;
- Apply housekeeping measures in the carpenter's shop
- Establish a system to prevent the particulates deposits at the loading point
- Reduce the losses in the transportation system

3.2.4. Waste management

Waste generation and management

Solid waste management is undertaken for the entire site. There are two types of solid waste produced at the site: 1) recyclable waste (metal, rubber) and 2) non-recyclable (sludge in the settling ponds, sterile from excavations), as follows:

- Recyclable waste:
  - Metallic waste, temporarily stored, and used outside the site, through UVA Rovinari;
  - Rubber waste from the transportation belts is temporarily stored. Part of it is regarded and reused, while ARTEGO Tg. Jiu uses the rest;
  - Spent oil with a theoretical recovery grade of 75%. Due to the equipment usage only 50% of the spent oil is recovered.
  - The following quantities of waste were recovered in 2003:
- Metallic wastes 350 tons
- Wood wastes 12 tons
- Rubber wastes (belt conveyors) 0.6 tons

- Prefabricated blocks 300 pcs.

- Wastes that are considered not-recyclable:
  - Sludge from settling ponds and from the surface settler is stored in the dump of the Jilt quarry
  - Domestic wastes delivered to the dump of Jilt quarry, through Local Household Management

General recommendations
The following recommendations are made to improve the waste management:

- Improve the management of non-recyclable solid waste to prevent uncontrolled waste disposal;
- Find a solution to eliminate the sawdust.

3.2.5 Noise and vibrations

The maximum allowed limit for the noise at the border of a company, establish by Romanian Standard STAS 10009-82, is of 50 dB. As a conclusion, there is no environmental noise impact.

Noise and vibrations are typical for a mine site. The main noise sources are the following:

- Combined cutting and loading and entry driving machines:
- Belt conveyors
- Transportation vehicles;
- Loading equipment

Most part of the equipment is used works underground and has no external impact.
Working area is located far the from the residential area, and flanks and vegetation reduce noise and vibration impacts.

3.2.6 Other issues

Liquid storage
Yearly, Dragotesti CM uses the following quantities of mineral oil and Diesel fuel:

- Diesel oil 7 T
- Light duty hydraulic oil 6 T
- M 20 multigrade oil 0.3 T
- T90 Belting oil 0.3 T
- TIN 125 oil 0.2 T
- Batching oil 2 T
- C 265 cylinders oil 5 T
- Ball bearing oil 2 T

Liquid products are kept in a storage, in 3 t storage tanks and in 100 l basins.
All the tanks are located at the ground level and installed on metallic supports (Fig.3.8). Broken stone is placed on storage area. The storage is closed and protected against unwanted visitors.

Fig. 3.8 Liquid storage (tanks and basins)

Risks of potential accidental spilling-over
Systematically storage of the oil and Diesel fuel in the storage tanks has a potential risk of spilling-over, due to:

- Lack of retention basins under the storage tanks
- Handling the oil without prevention measures, that leads spills on the ground

Recommendations addressed to these environmental aspects are the following:

- Install retention basins under the storage tanks
- Draft and implement procedure for handling liquids with adequate equipment
- Implement a monitoring program for checking the integrity of the tanks

Use of asbestos
According to the declarations of the interviewed persons at the site, asbestos is not used.

PCB
There are 19 power and transformers units. Nine 6kV/400 V medium power transformer stations are located underground. They are dry-type transformers.

The 20 kV/6 kV transformers, which are located on the ground and assure the power delivery, are not the property of the mine. The Power Distribution Company owns them.

It is considered that the transformers belonging to the mine have no PCB content.

Health and safety issues
Personnel in the mining site are exposed to dust, noise, and vibrations. The personnel works in the process areas for a limited time, and the cabins of the vehicles are protected against noise and dust.

Working environment is directly assessed by periodical toxicological test and indirectly assessed by monitoring the emissions in the aeration pipes. However, all these measurements do not directly establish the air quality in the working site, particularly for the parameters regarding

inspirable particulates. It is considered that the inspirable particulates and noise exceed the allowable limits in the working site.

The Health and Safety General Norms/1996, appendixes 14 and 15 establish the allowable limit for particulates of 10 mg/m^3. During the last years, the company did not record any cases of occupational diseases in its statistics, but the working conditions could induce other severe diseases.

General recommendations:

- Periodical monitoring of particulate concentration in the work area
- Provide workers with protection equipment

3.2.7 Permits and inspections

The Dragotesti CM had an environmental permit, obtained while it was part of the former Oltenia National Lignite Company (CNLO). The permit expired in December 2003. As the Turceni Energetic System has been reorganized, Dragotesti CM shall have to apply for and obtain a new permit according to the new organizational structure. The water management permit is no longer valid and a new permit shall be obtained.

The Environmental Guard—the environmental authority for inspections—inspects the Jilt CM 2-3 times each year. Following inspections conducted between 2001-2003, 43 measures were imposed by the environmental guard for improving solid waste management and control of particulates emissions.

3.3 ASSESSMENT OF ENVIRONMENTAL NON-COMPLIANCES

3.3.1 Methodology

The methodology for assessing the environmental non-compliance is similar to the methodology described in Chapter 2.3. for Jilt CM.

- Review each environmental media for all the activities, including:
  - Air emissions
  - Water: use, consumption, treatment and discharge
  - Wastes: type, nature, quantity and disposal
  - Noise
  - Soil: damage and rehabilitation
  - Other issues: working environment, asbestos using, PCB, general health and safety issues

- Activities for compliance with Romanian Environment Legislation consist of applicable short-term and long-term measures, in two separate steps:

- Short-term actions (0 to 2 years) to eliminate immediate environmental risks and to reduce emissions at source
- Long-term actions (3 to 7 years) to fully comply with all legal requirements.

Recommendations were drawn up for each instance of environmental non-compliance, based on background experience and existing technical solutions with reasonable implementation costs. All recommendations were evaluated from the cost point of view, based on estimates considering current costs in Romania and taking into account a potential opening of the market, as a result of the EU accession.

3.3.2 Summary of the results at the Dragotesti CM

The results are summarized in tables. Table 3.3 includes the actions and cost estimates for immediate and medium term compliance.

Table 3.3: Summary Of Environmental Compliance Costs for the Site of Dragotesti CM

Environ-mental media	Description of proposed actions	Costs of short-term compliance (€)	Costs of medium-term compliance (€)
Air	Reducing particulate emissions at the railcars loading point	15,000	€100,000
	Reducing particulate emissions at the Belt conveyors system by replacing protective covers	20,000	
	Mitigate fugitive emissions	15,000	
	Implementing a procedure to mitigate particulates emission at the coal storage	2,500	
Water	Improvement of water treatment process in settling ponds	15,000	
	Improvement of domestic water treatment process	10,000	
	Periodic cleaning of collection channels and settling ponds and septic tank	5,000	
	Monitoring program of wastewater discharges	2,000/year	
Soil	Install retention basins under the storage tanks	8,000	
	Apply housekeeping measures in the carpenter's shop	2,000	10,000
	Rehabilitation of the areas affected by mineral oil spills	2,000	
	Develop and implement procedures for mineral oil handling to prevent leakages on soil	1,000	

	Install a system to eliminate particulates deposits at the loading point		
	Pay damages for affected soil in Dragotesti village - 17.75 ha	Circa €7,000/year	Circa €10,000/year
Wastes	Improvement of not-recyclable waste management	1,000	
	Find a solution for sawdust control	1,000	
	Find a solution for recovering and eliminating liquid wastes (spent oil)	2,000	

Other environ-metal aspects	Install retention basins under storage tanks	See “Soil” above	
	Implement a monitoring program for checking the integrity of the tanks	500	
	Implement procedures for liquid product handling using adequate equipment	500	
	Diagnosis of transformers and capacitors, and collection and replacement of PCB containing oil, if necessary	5,000	
	Obtain environmental permits and agreements for extending the mine	5,000	10,000

* The costs are in accordance with World Bank estimates for remediation of lands affected by mining activities. These costs depend upon local situation, land configuration and use (agricultural or forestry).

PART 4

CONCLUSIONS

The environmental compliance audit at the Jilt and Dragotesti CM has found certain instances of non-compliances with current Romanian regulations, or with likely future regulations to be enacted in accordance with EU legislation. The main instances of environmental non-compliances are the following:

- **Air emissions**: Main non-compliances are caused by the lack of particulate retaining system 1) in the areas for loading railcars and 2) in the vicinity of open belt conveyors both at Jilt and Dragotesti CM. In order to achieve compliance, it is necessary to implement immediate measures based on different studies, and long-term measures which involve major changes of the loading system for the railcars.

- **Wastewater discharge:** the main environmental non-compliances regarding waste water discharges are caused by the inadequate operation of settling ponds and septic tanks and by not using a simple natural settling process. In order to comply with environmental legislation, short-term measures consisting of adequate operating practices and improvement of the treatment process need to be implemented.

- **Soil:** The soil damage is higher at the Jilt CM and lower at Dragotesti CM. Compliance actions at Jilt CM shall include soil rehabilitation and restoration to its initial destination. This activity involves continuous long-term investments. The final shut-down costs are significant. Implementing soil remediation measures is a real risk for Jilt CM. The previous activity at Dragotesti CM affected 17.75 Ha of soil, for which the company pays annual compensations.

- **Waste management and treatment:** The main non-compliance is caused by sterile storage in Bohorelu outer dump, because the existent inner dumps are already full. Continuing deposit of the sterile in the outer dump negatively impacts the soil and increases shut-down costs for the dump. Shutting-down the dump is required by MEWM Order 1147/2002, but by the time the dump will be shut-down, the mine will have to comply with EU legislation that will be in force at that time. The recovery of wastes does not completely comply with specific regulations, and wastes are stored in a non-controlled way in the sterile dump.

- **Liquid storage and handling** allows liquid losses that lead to the pollution of the soil.

- **Noise pollution:** the lack of sound absorption in the loading areas and belt conveyors in open spaces, located close to dwellings cause the main non-compliance regarding noise regulations. It is necessary to implement short-term measures, and to install noise protection systems, in correlation with measures for implementing air pollution

protection systems for eliminating air pollution. As part of implementing air protection measures, there is a need to develop a long-term evaluation study.

- **PCB:** This issue shall be immediately investigated to eliminate any hazardous pollution source.

- **Health and safety issues:** non-compliances are caused by general working conditions and subsequent non-compliance with health and safety regulations.

- **Power consumption:** is not the object of the audit, but taking into account that the sites are big power consumers, it is recommended to perform an energy balance and to establish measures for the optimization of power consumption.

The costs for implementing specific environmental compliance measures proposed for both coal mines are summarized in Table 4.1.

Table 4.1: Summary of the audit findings

Environmental media	**Cost of short-term environmental compliance measures (€)**	**Cost of medium-term environmental compliance measures (€)**
Air	114,000	360,000
Water	68,000 + 5,000 continuous	-
Soil	400/ha	700-1800/ha
Wastes	7,000	35,000-90,000
Noise	21,000	-
Other	34,500	20,000
TOTAL	**€244,500 and additional variable costs for soil remediation**	**€415,000-470,000 and additional variable costs for soil remediation**

* * *

ECEROM Grup thanks Chemonics International Inc. for the opportunity of carrying out this audit.

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